Cognitive Levels in TOEFL iBT Reading: A Bloom's Revised Taxonomy Approach

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Abstract

This study aims at analyzing the cognitive demands of the TOEFL iBT reading section utilizing the application of Bloom's Revised Taxonomy. 80 reading comprehension questions from four practice tests were categorized into cognitive levels, ranging from lower-order thinking skills (LOTS) to higher-order thinking skills (HOTS). The findings reveal a predominant focus on LOTS, with Understanding and Remembering constituting 53.75% and 16.25% of the questions, respectively. In contrast, HOTS, such as Analyzing and Evaluating, account for only 30% of the total questions, while the Creating level is absent. The absence of Creating in the reading section reflects the test's design, which prioritizes objective and time-efficient assessment methods, such as multiple-choice questions. Tasks that require creative responses are more time-consuming and subject to subjective evaluation, making them less feasible in standardized testing environments. The study concludes that while the TOEFL iBT reading section effectively measures foundational reading skills, it may not fully capture the higher-order cognitive processes essential for academic success. Expanding the assessment to include more HOTS and exploring methods to incorporate Creating tasks could provide a more comprehensive evaluation of students' academic readiness.

Keywords: Bloom's Revised Taxonomy, HOTS, iBT, LOTS, Reading, TOEFL

I. INTRODUCTION

The TOEFL iBT Reading Section is an important tool to measure the proficiency of non-native English speakers, especially applicants who have applied to enter academic institutions in countries where English is the dominant language [1]. This test is a high-stakes test, and its effectiveness and fairness are of great concern [2]. In particular, researchers and educators have examined how well the test evaluates a broad range of cognitive abilities necessary for academic success [3]–[5]. Cognitive frameworks, such as Revised Bloom's Taxonomy, have been increasingly adopted to analyze educational assessments, providing a structured way to categorize the thinking skills required by tasks [6], [7].

Revised Bloom's Taxonomy, developed by Anderson and Krathwohl [8], organizes cognitive skills into a hierarchy that ranges from lower-order thinking skills, such as remembering and understanding, to higher-order skills, including evaluating and creating [9]. This is a broad-based taxonomy in categorizing learning objectives and assessment tasks, ideal to serve as a framework for the analysis of standardized tests like TOEFL [10]. In education, it is important that assessment not only measures recall but also deeper levels of thinking such as critical analysis and synthesis [11], [12]. This framework, hence, permits a more profound understanding of whether TOEFL iBT is really developing higher-level orders or whether the test remains focused on the more basic tasks.

The questions in the reading section of TOEFL iBT could be mapped onto different levels in Revised Bloom's Taxonomy [13]. For instance, some of the items may have test-takers simply recall facts from the reading themselves (Remembering), whereas other items might ask them to interpret or explain concepts (Understanding). Higher-order items could ask test-takers to

compare or contrast ideas (Analyzing) or make judgments about arguments put forward in the text (Evaluating) [14]. Categorizing the questions in such a manner allows the determination of the level at which the test measures both the lower-order and the higher-order thinking skills [15]. This could very well explain why previous research indicates that most standardized tests tend to focus on lower-order thinking skills, which may not be representative in providing the comprehensive cognitive requirements necessary for academic success in an English-speaking environment [13], [16].

Higher-Order Thinking Skills form an important part of Bloom's Revised Taxonomy, with a use of six hierarchical cognitive process categories: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating [17]. HOTS correspond mainly to higher-order levels in this taxonomy: Analyzing, Evaluating, and Creating. These levels necessitate that learners do more than remember or superficially understand information. Instead, they call on the learners to think more elaboratively-either to break down knowledge into its parts (Analyzing), to make judgments based on criteria and standards (Evaluating), or to produce an original idea or product (Creating) [18].

For instance, at the level of Analyzing, which falls between the lower and higher levels, learners would be analyzing an argument or distinguishing between competing theories. On the level of Evaluating, they can establish the credibility of various sources or logically weigh options to make informed decisions [17]. At the Creating level, they produce new knowledge from various resources, developing new solutions or hypothesizing about new theories [19]. These cognitive processes are quintessential in problem-solving and critical thinking at a time when solving real and academic problems becomes instrumental.

Because of this, Bloom's Revised Taxonomy not only classifies learning objectives but also gives emphasis to the process of higher-order thinking competencies that truly prepare students for higher complexity and dynamism for environments [20]. Educators can then focus on the upper levels of this taxonomy so as to promote deeper learning in equipping students with the skills necessary in analyzing, evaluating, and creating efficiently [21].

Evidence of how the application of Bloom's Revised Taxonomy is done in TOEFL and other proficiency tests to assess reading comprehension skills indicates that such a taxonomy outlines the research into cognitive skills. Indeed, a number of studies have already demonstrated that TOEFL iBT-a standardized test that is intended to measure the academic English ability of non-native speakers [22]–[25]. Some have conducted a detailed analysis of reading comprehension questions in the TOEFL iBT [26]. Though most of the questions dealt with LOTS such as Remembering and Understanding, quite a big part belonged to HOTS such as Analyzing and Evaluating in this study. Their work focused on how HOTS in the preparation of students is highly important for real academic environments where success significantly depends on the level of critical thinking and analysis [27]. Another study investigated the representation of cognitive levels of Bloom's Revised Taxonomy in TOEFL iBT Reading [28]. They stated that the test developers consciously planned to have a representation of different cognitive levels so as the test-takers exercised recalling but also applied, analyzed, and evaluated information [29].

Using Revised Bloom's Taxonomy to analyze the TOEFL iBT reading examinations provides insights into the strengths and potential shortcomings of the test design [30]. If the test focuses disproportionately on lower-order skills like remembering and understanding, it may not adequately prepare students for the academic challenges they will face in higher education, where higher-order skills such as critical analysis and synthesis are essential [31]. On the other hand, to the extent the test is representative of a balanced mix of cognitive skills, it may then become a more panoramic assessment tool that can better predict how well a student will be able to succeed in an English-speaking academic environment. The understanding of such a

International Journal of Business, Education, Humanities and Social Sciences
e-ISSN: 2685-0931| p-ISSN: 155020589
Vol 6 No 2 (2024)

balance is beneficial for educators and policymakers alike who wish to develop the TOEFL iBT test in ways that enhance fairness and effectiveness.

In conclusion, this study seeks to explore the cognitive demands of the TOEFL iBT reading section by applying Revised Bloom's Taxonomy as an analytical framework. By identifying the cognitive levels represented in the test, the study will provide valuable information about the test's design and effectiveness in measuring a range of cognitive skills. Such a test analysis might offer suggestions to make the test design better in order to be able to present fairer measures, ones which would put a student on a better footing against the challenges they will face during academic life. In the final analysis, the assurance that TOEFL iBT reading test represents a broad range of cognitive processes, institutions will benefit along with the test-takers to make decisions regarding admission.

II. METHOD

A. *Research Design*

This study adopted the content analysis method for its research design and systematically analyzed reading comprehension questions in the TOEFL iBT textbook [32]. Content analysis is a methodology commonly used in educational research, which investigates textual materials in depth and objectively, providing the researcher with the chance to categorize and quantify the content in a structured way [33].

B. *Source of Data*

The data for the research reported here were exclusively based on The Official Guide to the TOEFL iBT Test, Seventh Edition, 2024, by McGraw Hill, authored by the Educational Testing Service (ETS) [34]. Since this book is widely regarded as an authoritative resource for students getting ready for the TOEFL, it has proven to be a highly appropriate choice for carrying out a thorough analysis of the cognitive demands of the reading part.

The goal of the study was to produce a thorough, focused understanding of the cognitive processes involved; therefore, it only addressed the reading comprehension questions found in textbooks. In order to facilitate comprehension, the reading comprehension portion of the test was separated from the other portions to allow for the development of the thinking levels required by the questions. This focus is important because it allows Revised Bloom's Taxonomy to be applied more precisely in assessing the cognitive abilities required in the reading component of the TOEFL iBT.

C. *Instrument*

Data collection and analysis were conducted directly by the researcher, ensuring a consistent approach throughout the study. The researcher employed an adopted checklist table as an instrument to gather and categorize the data [35]. This checklist table was designed to classify the reading comprehension questions based on the six levels of cognitive processes in Revised Bloom's Taxonomy ranging from lower-order skills such as remembering and understanding to higher-order skills like analyzing, evaluating, and creating. By using this tool, the researcher was able to systematically identify the frequency and distribution of questions across these cognitive levels.

TABLE I.   ANALYSIS CHECKLIST

Practice Test No	Reading Test Question	Cognitive Domain					
		LOTS			HOTS		
		C1	C2	C3	C4	C5	C6
1	Q1	√					

The coding and analyzing of data were quite instructive using a checklist table, since each reading comprehension question was matched against the taxonomy for appropriate cognitive level classification. For example, a question that would ask the test-taker to recall particular details in a reading passage would fall under the "Remembering" category, whereas a question that would ask the test-taker to evaluate how good or bad the argument presented is would fall under the "Evaluating" category. This structured approach made it possible to analyze in great detail the degree to which TOEFL iBT reading comprehension questions fit into various cognitive demands.

D. Research Procedure

The research procedure for analyzing TOEFL iBT reading tests using Revised Bloom's Taxonomy through content analysis involves several key steps. First, research questions are formulated to determine how the test questions align with the cognitive processes in Bloom's Taxonomy, such as remembering, understanding, applying, analyzing, evaluating, and creating. Next, a representative sample of reading passages and corresponding questions from the TOEFL iBT is selected. The units of analysis, in this case, would be the individual test questions. A coding scheme is then developed based on the six categories of Revised Bloom's Taxonomy, and then apply this scheme to classify each question. The analysis involves quantifying the frequency of questions at each cognitive level and comparing these to understand how the test measures higher-order cognitive skills. The findings are then interpreted in relation to the test's ability to assess both lower-order and higher-order thinking skills, contributing to test validity. This systematic approach to content analysis is guided by the methodological principles outlined by Krippendorff [32].

III. RESULTS AND DISCUSSIONS

In all, there are four full practice tests in The Official Guide to the TOEFL iBT Test, Seventh Edition (2024); each test has a section on reading. Each of these practice sets is designed to simulate the actual TOEFL iBT experience, offering test-takers a realistic environment in which to prepare for the reading portion of the exam. In each of the practice tests, the reading portion gives an opportunity for examinees to read passages together with accompanying questions; altogether, two passages are provided in a sequence of 36 minutes. Each passage may also include footnotes or explanatory notes explaining unfamiliar words or phrases for understandable context to the test-taker. These notes are particularly useful for students who are non-native speakers and may come across some specialist or complex vocabulary.

Most of the reading comprehension questions are one-point each, except for the last question of each passage, which is two points. Given this structure, it goes without saying that particular watchfulness of time has to be underscored, especially since the last questions are weighted and will most probably make or break the entire score. This 36-minute time frame is very much open, and a candidate who can manage this well will most definitely have a better chance at performing at the highest possible level, especially when tackling those higher-point-value questions towards the end of each passage.

TABLE II. READING TEST QUESTIONS

Test	Passages	Questions
Practice Test 1	2	20
Practice Test 2	2	20
Practice Test 3	2	20
Practice Test 4	2	20
Total	**8**	**80**

International Journal of Business, Education, Humanities and Social Sciences
e-ISSN: 2685-0931| p-ISSN: 155020589
Vol 6 No 2 (2024)

The table above summarizes the structure of four TOEFL iBT practice tests by focusing on the number of passages and questions that each test has. These practice tests consist of two reading passages and twenty questions that should be answered for each test. There are eight passages and 80 questions total across all practice exams.

As far as question types go, they tend to be mostly multiple-choice questions. Test takers will select the appropriate answer from among choices provided. Sometimes, there are other question types that may require test takers to select more than one answer, put items in order, or summarize information in their own words, based on the reading passage. But the majority of the questions are multiple-choice.

A. *Distribution of Cognitive Levels*

By applying the theory of Revised Bloom's Taxonomy, this research analyzes 80 reading comprehension questions from four practice tests presented in the textbook entitled The Official Guide to the TOEFL iBT Test, Seventh Edition, published by McGraw Hill in 2024. The research categorizes each question based on the cognitive processes defined by taxonomy, which includes levels such as Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating.

Table III summarizes the frequency of questions in each cognitive level across the four practice tests, highlighting the distribution of cognitive skills tested. The findings of the research reveal that the Understanding level is the foremost frequently tested cognitive ability within the TOEFL iBT perusing comprehension segment. Over the four practice tests, understanding accounts for 53.75% of the entire questions, indicating that the lion's share of the questions requires test-takers to comprehend and decipher data displayed within the sections.

TABLE III. READING TEST DISTRIBUTION OF COGNITIVE LEVEL

Cognitive Level	Cognitive Domains	Practice Test 1	Practice Test 2	Practice Test 3	Practice Test 4	Total
LOTS	Remembering	3 (15%)	3 (15%)	4 (20%)	3 (15%)	13 (16.25%)
	Understanding	9 (45%)	12 (60%)	9 (45%)	13 (65%)	43 (53.75%)
	Applying	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
HOTS	Analyzing	6 (30%)	3 (15%)	5 (25%)	2 (10%)	16 (20%)
	Evaluating	2 (10%)	2 (10%)	2 (10%)	2 (10%)	8 (10%)
	Creating	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Total	20 (100%)	20 (100%)	20 (100%)	20 (100%)	80 (100%)
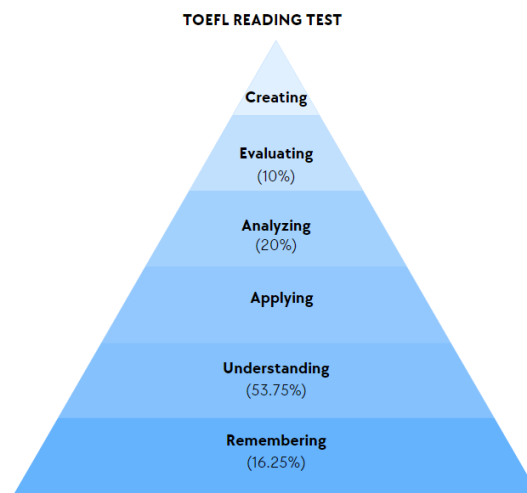
Figure 1.   Bloom's Revised Taxonomy Pyramid

International Journal of Business, Education, Humanities and Social Sciences
e-ISSN: 2685-0931| p-ISSN: 155020589
Vol 6 No 2 (2024)

Following understanding, the analyzing level makes up 20% of the total questions, demonstrating a significant focus on breaking down information, identifying patterns, and drawing connections between ideas. The remembering level, which involves recalling facts and details, ranks third at 16.25% of the total questions. In addition, evaluating, which involves making judgments based on criteria or evidence represents 10% of the total questions. Interestingly, there are no questions that fall under the applying or creating levels, suggesting that the reading comprehension questions do not require test-takers to apply concepts to new situations or generate original ideas.

This distribution suggests that the TOEFL iBT reading comprehension section prioritizes skills related to understanding and analyzing written material, which aligns with the test's goal of assessing academic reading proficiency [36]. The absence of questions in the Applying and Creating categories highlights the test's limited emphasis on higher-order cognitive skills such as application and innovation. Instead, the focus remains on comprehension and critical analysis, reflecting the demands of academic environments where students are expected to interpret, analyze, and evaluate texts.

In Remembering, the focus is on the ability to recall or recognize information that has been previously learned. This cognitive level involves basic knowledge retrieval without requiring deep understanding or analysis. An example of this can be seen in question 6 of Practice Test 1, where the task asks the test-taker to determine the closest meaning of the word "concept" in the passage. The question provides four answer choices, and the correct answer is D) idea. In the passage, the word "concept" is used to describe the Whigs' understanding of government power and its role in promoting the general welfare. The word "concept" refers to an abstract notion or general idea, making "idea" the most appropriate synonym in this context. This question exemplifies the Remembering level because the test-taker is simply required to recall the definition of the word "concept" or recognize it from the given choices. It does not require a deep analysis of the passage or application of the word in a new context, but rather the ability to retrieve previously learned information about word meanings. This makes it a clear case of a Remembering question, which focuses on knowledge recall and recognition.

In Understanding, the focus is on the ability to comprehend and interpret information, going beyond mere recall. This level involves making sense of the material, inferring meanings, and connecting ideas. As an example, in question 1 of Practice Test 2, the task asks the test-taker to infer information about theatrical dance in the late nineteenth century, based on a passage about the United States dancer Loie Fuller. The correct answer is C) It was more a form of entertainment than a form of serious art. This inference is based on Loie Fuller's statement that she considered theatrical dance "artistically unsatisfying" and considered herself more of an artist than an entertainer. This implies that theatrical dance is viewed more as an entertainment form than a serious art form.

This question demonstrates the Understanding level because it requires the test-taker to comprehend the passage and infer meaning. Rather than just recognizing facts or definitions, the test-taker must interpret the passage and make connections between Loie Fuller's artistic dissatisfaction and the general perception of theatrical dance at the time. This process of interpretation and inference is characteristic of Understanding, as it involves grasping the underlying meaning of the text and using context to make an informed judgment.

When analyzing, the main goals are dissecting data into its constituent pieces, looking for connections, and coming to reasoned conclusions based on the structure of the material. As an example, in question 9 of Practice Test 3, the test-taker is asked to determine the best location for a sentence to be added to the passage. This question falls under the Analyzing category of Bloom's Taxonomy because it requires the test-taker to examine the structure of the passage and analyze the flow of ideas. Rather than simply recalling or understanding the content, the

International Journal of Business, Education, Humanities and Social Sciences
e-ISSN: 2685-0931| p-ISSN: 155020589
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test-taker must break down the paragraph into its parts, evaluate the relationships between those parts, and then decide where the new sentence would best fit. This process of dissecting the passage and understanding the logical sequence of ideas is characteristic of the Analyzing level.

In Evaluating, the focus is on making judgments based on criteria and evidence. This involves assessing the relevance, importance, and validity of information to determine its overall value in a given context. As an example, in question 20 of Practice Test 4, the task asks the test-taker to select three statements that best summarize the key ideas in the passage on yawning. The introductory sentence states that "The tiredness theory of yawning does not seem to explain why yawning occurs," and the test-taker must choose the options that best support this claim while omitting minor or irrelevant details.

This question fits under the Evaluating category of Bloom's Taxonomy because it requires the test-taker to judge the importance and relevance of different pieces of information in order to summarize the passage effectively. The task is not merely about recognizing facts (which would fall under Remembering) or understanding the content (which would be Understanding). Instead, the test-taker must evaluate which statements are the most critical and best support the central idea that the tiredness theory of yawning is insufficient, while also eliminating choices that either do not contribute to the main argument or are less significant. This process of assessing the value and relevance of each option, weighing its contribution to the overall summary, and making judgments based on the content of the passage are all essential elements of evaluating.

TABLE IV. REMEMBERING QUESTIONS

Practice Test	Question Numbers for Remembering
Practice Test 1	6, 11, 12
Practice Test 2	4, 13, 17
Practice Test 3	2, 4, 11, 18
Practice Test 4	3, 13, 17

TABLE V. UNDERSTANDING QUESTIONS

Practice Test	Question Numbers for Understanding
Practice Test 1	1, 2, 3, 4, 8, 13, 14, 17, 18
Practice Test 2	1, 2, 3, 5, 6, 7, 8, 11, 12, 14, 15, 18
Practice Test 3	1, 3, 5, 6, 8, 12, 13, 14, 15
Practice Test 4	1, 2, 4, 5, 6, 7, 8, 11, 12, 14, 15, 16, 18

TABLE VI. ANALYZING QUESTIONS

Practice Test	Question Numbers for Analyzing
Practice Test 1	5, 7, 9, 15, 16, 19
Practice Test 2	9, 16, 19
Practice Test 3	7, 9, 16, 17, 19
Practice Test 4	9, 19

TABLE VII.   EVALUATING QUESTIONS

Practice Test	Question Numbers for Evaluating
Practice Test 1	10, 20
Practice Test 2	10, 20
Practice Test 3	10, 20
Practice Test 4	10, 20

TABLE VIII.   HOTS AND LOTS QUESTIONS

Level	Frequency	Percentage
HOTS	24	30%
LOTS	56	70%

B. Thinking Skills

The results of the analysis in Table VIII show a clear distribution between Higher-Order Thinking Skills (HOTS) and Lower-Order Thinking Skills (LOTS) in reading comprehension questions. HOTS questions, which include Analyzing, Evaluating, and Creating, make up 30% of the total, while LOTS questions, which cover Remembering, Understanding, and Applying, account for 70% of the total.

This distribution indicates that the majority of the questions in the reading comprehension tests emphasize LOTS. Understanding, the most common level under LOTS, focuses on the test-takers' ability to comprehend information and make basic inferences [15]. This suggests that the TOEFL iBT reading section, while testing some critical thinking, is largely designed to assess how well students can recall, understand, and apply information presented in academic texts [37]. Since the TOEFL iBT is a standardized test for non-native English speakers aiming to study in academic institutions, this focus on LOTS aligns with its goal of ensuring students can handle the foundational academic reading skills required for university-level coursework [38].

The presence of 30% HOTS questions highlights the importance of critical thinking and more advanced cognitive processes. Questions that fall under Analyzing, for example, often require test-takers to evaluate relationships between ideas, compare different concepts, and understand the structure of arguments. Evaluating questions may involve making judgments about the accuracy or relevance of information [39]. The absence of Creating questions is consistent with the nature of the TOEFL iBT reading section, which is primarily focused on interpretation and comprehension rather than generating new ideas or concepts.

C. Discussion

Based on the findings, the small number of HOTS questions on the TOEFL iBT Reading section may be explained by a number of practical and educational factors that affect this design (Suzuki & Kosuga, 2024). Primarily, the TOEFL iBT has been designed to test, with the help of several sections, the basic academic reading abilities of candidates who are non-native speakers and who enroll in English-speaking institutions [41]. Consequently, the test retains its LOTS character with 70% of the questions targeting skills of remembering and understanding information. This is to ensure that students demonstrate a grasp of basic comprehension, an essential ingredient in academic work, and form the baseline measure of students' proficiency in engaging with English language texts at school [42].

Moreover, there are practical considerations involving time and standardization with regard to this design. Specifically, HOTS questions tend to engage intricate cognitive processes and

International Journal of Business, Education, Humanities and Social Sciences
e-ISSN: 2685-0931| p-ISSN: 155020589
Vol 6 No 2 (2024)

take longer to answer adequately [25]. Since the TOEFL iBT is a timed standardized test [43], the inclusion of a greater proportion of HOTS questions runs the risk of test-takers showing variation in completion times, which may affect test fairness and reliability [44]. Additionally, HOTS questions require subjective assessments-especially at the level of "Creating" which students can even come up with really original responses. Such questions are thus always problematic to grade in a standardized manner, since nuanced judgment is required rather than straightforward scoring easily done with LOTS-oriented multiple-choice questions [45].

Because of its huge scale and objectivity, the TOEFL iBT must be designed to provide consistent, dependable grading for thousands of test takers [46]. Multiple-choice formats are favored because they offer clear, objective criteria for scoring, ensuring that grading stays uniform across a diverse population of test-takers [29]. As a result, while using HOTS questions might be more relevant in terms of gaining insight into students' critical thinking, its application in a standard assessment that must be evaluated quickly and impartially is limited [47].

Therefore, the TOEFL iBT's emphasis on LOTS only serves to highlight the test's ability to serve as a reliable indicator of academic reading proficiency [24]. This approach does indeed restrict the test's ability to engage with higher-order cognitive processes in any thoroughgoing manner. The main rationale, however, is the requirement for uniformity and fairness in a high-stakes, standardized testing setting. In order to properly meet the demands of the higher-order cognitive assessment, the extension of HOTS inside TOEFL iBT would require adjustments to format, duration, and grading methodology, even though this would add an additional aspect to the test-taker's critical thinking.

IV. CONCLUSION

In conclusion, the analysis of the TOEFL iBT reading section using the Revised Bloom's Taxonomy shows a strong emphasis on lower-order thinking skills (LOTS), especially Remembering and Understanding, which comprise 70% of the questions deemed essential for basic comprehension Meanwhile, higher-order thinking skills (HOTS), in the form of Analyzing and Evaluating, comprise only 30% of the test questions, suggesting limited assessment of more complex cognitive abilities such as critical thinking and judgment, which are considered essential for academic success.

The absence of Creating in the TOEFL iBT reading section reflects the inherent constraints and focus of the test. Creating, which involves generating new ideas, synthesizing information, and producing original work, is not typically assessed in reading comprehension tests because such tasks require subjective evaluation and more extensive time for completion. Reading assessments are designed to efficiently evaluate a large number of students, making objective, standardized question formats like multiple-choice more practical. Moreover, the primary goal of the TOEFL iBT is to assess students' readiness for academic reading in English-speaking environments, where understanding and analyzing existing texts are more relevant than producing new content.

The current structure of the TOEFL iBT reading section effectively measures foundational reading skills; however, its focus on LOTS may not fully reflect the range of cognitive demands students will encounter in higher education, where higher-order thinking skills are critical. Incorporating more HOTS, and perhaps finding innovative ways to evaluate Creating in future assessments, could provide a more comprehensive evaluation of students' academic readiness and their ability to tackle complex tasks in an academic setting.

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e-ISSN: 2685-0931| p-ISSN: 155020589
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